

ABSTRACT OF THE DISCLOSURE

A method and apparatus for improving the surface finish and/or surface integrity of a workpiece formed or shaped with a tool increase the surface hardness of the workpiece during forming or shaping of the workpiece. A method and apparatus for forming or shaping a workpiece also increase the surface hardness of the workpiece during forming or shaping of the workpiece with a tool, as do a method and apparatus for manufacturing a finished part or product from a workpiece. In some embodiments, an expanding jet of cryogen may be jetted to a surface of a workpiece and a tool from a nozzle, wherein the cryogen is at least partially separated into a condensed phase portion and a vapor portion within a downstream portion of the nozzle.